

# **SEMICONDUCTOR DEVICE, METHOD OF MANUFACTURING THE SAME, CIRCUIT BOARD AND ELECTRONIC APPARATUS**

**What is claimed is:**

**1. A method of manufacturing a semiconductor device, comprising the steps of:**

**forming a protrusion on a semiconductor substrate having a first area and a second area surrounding the first area, the protrusion protruding above the first area;**

**disposing a support on a surface on which the protrusion is formed, of the semiconductor substrate, a part of the support overlapping with the second area being thicker than another part of the support overlapping with the first area; and**

**grinding the semiconductor substrate from a surface opposite to the surface on which the protrusion is formed.**

**2. A method of manufacturing a semiconductor device, comprising the steps of:**

**disposing a resin layer on a first area of a semiconductor substrate, the semiconductor substrate having a second area surrounding the first area;**

**disposing a support on a surface on which the resin layer is disposed, of the semiconductor substrate, a part of the support overlapping with the second area being thicker than another part of the support overlapping with the first area; and**

**grinding the semiconductor substrate from a surface opposite to the surface on which the resin layer is disposed.**

**3. A method of manufacturing a semiconductor device, comprising the steps of:**

**disposing a resin layer on a first area of a semiconductor substrate, the semiconductor substrate having a second area surrounding the first area;**

**disposing a protruding electrode on the resin layer;**

**disposing a support on a surface on which the resin layer is disposed, of the semiconductor substrate, a part of the support overlapping with the**

second area being thicker than another part of the support overlapping with the first area; and

grinding the semiconductor substrate from a surface opposite to the surface on which the resin layer is disposed.

4. The method of manufacturing a semiconductor device according to any one of Claims 1 through 3, wherein:

the second area is an outer end of the semiconductor substrate.

5. The method of manufacturing a semiconductor device according to any one of Claims 1 through 4, wherein:

the step of disposing the support includes a step of forming the support by coating the semiconductor substrate with resin by spin-coating .

6. The method of manufacturing a semiconductor device according to Claim 5, wherein:

the step of disposing the support includes a step of forming a raised portion of the resin on the second area.

7. The method of manufacturing a semiconductor device according to Claim 5 or 6, wherein:

the step of disposing the support includes a step of pressing to planarize a surface of the resin.

8. The method of manufacturing a semiconductor device according to Claim 1, wherein:

the support includes an adhesive sheet having an adhesive layer thicker than the height of the protrusion; and

the step of disposing the support includes a step of forming the support by pressing the semiconductor substrate against the adhesive sheet to eject at least a part of the adhesive layer outside the protrusion.

9. The method of manufacturing a semiconductor device according to Claim 2, wherein:

the support includes an adhesive sheet having an adhesive layer thicker than the thickness of the resin layer; and

the step of disposing the support includes a step of forming the support by pressing the semiconductor substrate against the adhesive sheet to eject at least a part of the adhesive layer outside the resin layer.

10. The method of manufacturing a semiconductor device according to Claim 3, wherein:

the support includes an adhesive sheet having an adhesive layer thicker than the total thickness of the resin layer and the protruding electrode; and

the step of disposing the support includes a step of forming the support by pressing the semiconductor substrate against the adhesive sheet to eject at least a part of the adhesive layer outside the resin layer and the protruding electrode.

11. A method of manufacturing a semiconductor device, comprising the steps of:

forming a protrusion on a semiconductor substrate having a first area and a second area surrounding the first area, the protrusion protruding above the first area;

disposing a support on a surface on which the protrusion is formed, of the semiconductor substrate so that a through hole of the support overlaps with the first area; and

grinding the semiconductor substrate from a surface opposite to the surface on which the protrusion is formed.

12. A method of manufacturing a semiconductor device, comprising the steps of:

disposing a resin layer on a first area of a semiconductor substrate, the semiconductor substrate having a second area surrounding the first area;

disposing a support on a surface on which the resin layer is disposed, of the semiconductor substrate so that a through hole of the support overlaps with the first area; and

grinding the semiconductor substrate from a surface opposite to the surface on which the resin layer is disposed.

13. A method of manufacturing a semiconductor device, comprising

the steps of:

disposing a resin layer on a first area of a semiconductor substrate,  
the semiconductor substrate having a second area surrounding the first area;

disposing a protruding electrode on the resin layer;

disposing a support on a surface on which the resin layer is disposed,  
of the semiconductor substrate so that a through hole of the support  
overlaps with the first area; and

grinding the semiconductor substrate from a surface opposite to the  
surface on which the resin layer is disposed.

14. The method of manufacturing a semiconductor device according  
to any one of Claims 11 through 13, wherein:

the second area is an outer end of the semiconductor substrate.

15. The method of manufacturing a semiconductor device according  
to Claim 14, wherein:

the support is formed on the periphery of the through hole and has a  
step for disposing the outer end of the semiconductor substrate.

16. The method of manufacturing a semiconductor device according  
to any one of Claims 11 through 15, wherein:

the support is made of resin.

17. The method of manufacturing a semiconductor device according  
to Claim 16, wherein:

the step of disposing the support includes a step of curing the resin.

18. The method of manufacturing a semiconductor device according  
to any one of Claims 1 through 17, wherein:

the first area is an area of an effective chip having an integrated  
circuit and becoming a product; and

the second area is an area of a periphery chip which does not become a  
product.

19. The method of manufacturing a semiconductor device according  
to any one of Claims 1 through 18, further comprising the step of:

cutting the semiconductor substrate with the support disposed on the semiconductor substrate after the step of grinding the semiconductor substrate.

20. The method of manufacturing a semiconductor device according to any of Claims 1 through 19, further comprising the step of:  
removing the support from the semiconductor substrate after the step of grinding the semiconductor substrate.

21. A method of manufacturing a semiconductor device, comprising the steps of:

disposing a resin layer on a first and a second areas of a semiconductor substrate, the first area becoming a product and the second area surrounding the first area not becoming a product;

disposing a protruding electrode on the resin layer and above the first and the second areas; and

grinding the semiconductor substrate from a surface opposite to the surface on which the resin layer is disposed.

22. The method of manufacturing a semiconductor device according to Claim 21, wherein:

the second area includes an area of a part which includes a side face of the semiconductor substrate and becomes a semiconductor chip.

23. A semiconductor device manufactured by the method according to any one of Claims 1 through 22.

24. A circuit board equipped with the semiconductor device according to Claim 23.

25. An electronic apparatus comprising the semiconductor device according to Claim 23.

## (DETAILED DESCRIPTION)

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## FIELD OF THE INVENTION